User Manual for TennisSonicPro Simulator

The goal of this simulator is to help beginners optimize their tennis stroke to hit incoming balls with their racket's sweet spot. Based on certain conditions such as ball trajectory, the user would move the racket horizontally and try to time their movements to allow the incoming ball to move through the racket's sweet spot, represented by the green area on the racket.

Interface Overview

- Tennis Court Visualization: The main area of the screen visualizes a tennis court where the simulation of racket movement takes place.
- Premade Scenario Control Panel: Located on the top right corner, this panel of three buttons allows the researcher to choose premade scenarios. The system takes in the respective JSON file of events and the system visualizes those events and produces the respective sonification audio.
- Researcher Sonification Sliders: located at the bottom left hand corner, it features 4 different sonification schemes to allow the researcher to conduct Wizard of Oz testing.
- Manual Ball Trajectory Settings: located horizontally at the bottom of the screen below the court, it is to be used in conjunction with the researcher sonification sliders for Wizard of Oz testing, the researcher would utilize these settings to adjust where the ball is shot from and where it is shot towards.

Sonification Scheme

TennisSonicPro employs a detailed sonification approach, where different aspects of tennis data are represented through sound:

Ball Trajectory:

- Stereo panning represents the incoming ball's trajectory (left or right) and is heard in the corresponding stereo channel.

Ball Speed:

- The speed of the ball alters the pitch of the SAW wave. Faster speeds result in a higher pitch, while slower speeds lower the pitch.

Court Ambience:

- Background sounds of the tennis court can be adjusted for volume, adding realism and context to the simulation.

Swing Timing:

- Swing Timing is sonified using a metronome, where an incoming ball indicating a far landing area quickens the tempo, urging rapid racket movement to the incoming ball. Conversely, closer landings slows the metronome, suggesting more relaxed racket movement towards the incoming ball.

Using the Simulator **- <u>Please follow the instructions accordingly, the program is not perfect and may not work accordingly if the suggested instructions are not followed</u>**

<u>To run the premade scenarios powered by JSON data stream:</u>

- For some reason one scenario can't be played after another has been played, otherwise the audio won't work on the second try. Every time you would like to play a premade scenario, you should restart the program and follow the below instructions:
- Upon starting the program, toggle the individual sonification schemes on/off and play around with the sliders to understand how each of them work
    - ***This has to be done before trying out the sonification for the premade scenarios otherwise the premade scenarios would play out without any audio**
- Choose any one of the premade scenarios - before this you MUST toggle any one of the individual sonification sliders on/off to get the sonification system running
    - You should see the racket trying to move towards an incoming ball which may or may not pass through the racket's sweet spot.
    - At the same time, you should hear the sonification triggered by the event stream from the scenario
- Click reset to stop the sonification audio

<u>Controls for Wizard of Oz testing:</u>

- Use left and right arrow keys to move the racket
- Choose start and target positions to set the trajectory of the incoming ball and adjust slider to set ball speed. When the user is ready, press "Shoot".
- The user then has to move the racket left or right to try to optimize their movement and align the incoming ball through the green area.
- The researcher can choose to toggle individual sonification schemes to aid the player's movement.

Misc:

- Amplitude envelope is implemented on the audio played whenever the “Shoot” button is clicked.
- TTS is implemented at the start of the program and welcomes the player